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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|---------------------|------------------|
| 10/659,068 | 09/08/2003 | Loren A. Chow | 42P13741C | 2751 |
| 8791 | 7590 | 08/05/2004 | EXAMINER | |
| BLAKELY SOKOLOFF TAYLOR & ZAFMAN 12400 WILSHIRE BOULEVARD SEVENTH FLOOR LOS ANGELES, CA 90025-1030 | | | HUYNH, ANDY | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2818 | |

DATE MAILED: 08/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|--------------------------------------|---------------------------------------|---|
| Office Action Summary | Application No. 10/659,068 | Applicant(s) CHOW, LOREN A. | |
| | Examiner Andy Huynh | Art Unit 2818 |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 8 and 9 is/are allowed.
- 6) ☒ Claim(s) 1-5 and 10 is/are rejected.
- 7) ☒ Claim(s) 6 and 7 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>10/03/2003</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claims **1-10** are pending in this application, which is a continuation of U.S. Patent Application No. 10/215,130, filed August 8, 2002 USP: 6,674,146, is acknowledged.

Information Disclosure Statement

This office acknowledges receipt of the following items from the applicant: Information Disclosure Statement (IDS) filed on October 3, 2003. The references cited on the PTOL 1449 form have been considered.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims **3 and 10** are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims **3 and 10**, line 1, "the contribution" lacks antecedent basis.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are

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such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims **1-2 and 4-5** are rejected under 35 U.S.C. 103(a) as being unpatentable over Barth et al. (USP: 6,726,996 hereinafter referred to as "Barth") in view of Heremans et al. (USP: 5,081,053 hereinafter referred to as "Heremans") and Ramdani et al. (US Pub. No. 2002/0003238 hereinafter referred to as "Ramdani").

Regarding claim 1, Barth disclose in Fig. 3 and corresponding texts as set forth in column 3, line 51-column 7, line 35, an apparatus/a diffusion barrier comprises:

a contact point/a wiring region (22) formed on a device layer of a circuit substrate (20) or interconnect layer on the substrate (col. 6, lines 52-61);

a first dielectric layer/a dielectric film of low-permeability (12) comprising boron nitride (BN) (col. 4, lines 55-60) on the substrate; and

a different second dielectric layer/a dielectric film of high-permeability (14) on the substrate and separated from the device layer by the first dielectric layer.

Barth fails to teach a first dielectric layer comprising cubic boron nitride.

Heremans teaches that boron nitride (BN) is characterized by three different crystal structure: hexagonal, wurtzite and cubic zincblende. The cubic form of the boron nitride is particularly useful since it is characterized by many desirable physical properties including high electrical resistivity and high thermal conductivity, and is also useful for electronic devices, particularly at high temperatures (col. 1, lines 15-28).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize the first dielectric comprising the cubic form of the boron nitride, as taught by Heremans to form the claimed limitation since the cubic form of the boron nitride is

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particularly useful and is characterized by many desirable physical properties including high electrical resistivity and high thermal conductivity, and is also useful for electronic devices, particularly at high temperatures.

Ramdani also teaches that the cubic boron nitride (CBN) films exhibit high heat conductivity and yet are electrically insulating, so they may be used as dielectric or insulating films for semiconductor manufacturing applications as set forth on page 1, paragraph [0003].

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize the first dielectric comprising the cubic form of the boron nitride, as taught by Ramdani to form the claimed limitation since the cubic boron nitride (CBN) films exhibit high heat conductivity and yet are electrically insulating, so they may be used as dielectric or insulating films for semiconductor manufacturing applications.

Regarding claim 2, Barth, Heremans and Ramdani disclose the claimed limitations except for the apparatus wherein collectively the first dielectric layer and the second dielectric layer comprise a composite dielectric layer having a composite dielectric constant value less than 3.0. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to utilize the first dielectric layer and the second dielectric layer comprise a composite dielectric layer having a composite dielectric constant value less than 3.0, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claim 4, Barth disclose in Fig. 3 the apparatus further comprises a third dielectric layer/a second dielectric film of low-permeability (12) on the substrate such that the second dielectric layer (14) is between the first dielectric layer/the first dielectric film of low-

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permeability (12) and the third dielectric layer and collectively the layers define a composite dielectric layer, wherein the third dielectric layer comprises a material having a dielectric constant similar to the material of the first dielectric layer.

Regarding claim 5, Barth, Heremans and Ramdani disclose the claimed limitations except for the apparatus further comprising a contact through the composite dielectric layer. It would have been obvious to one of ordinary skill in the art at the time of the invention was made to form a contact through the composite dielectric layer since it was known in the art that the contact is used for external or other connections with other devices.

Allowable Subject Matter

Claims 6-7 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, since the prior made of record and considered pertinent to the applicant's disclosure does not teach or suggest the claimed limitations.

Barth, Heremans and Ramdani, taken alone or in combination, fail to teach the claimed limitation the apparatus wherein the contact has a body with a length dimension extending through the composite dielectric layer and the third dielectric material is formed on the length dimension of the body between the contact and the second dielectric layer as recited in claim 6.

Claims 8 and 9 are allowed. The following is a statement of reason for the indication of allowable subject matter:

Claims 8 and 9 are considered allowable since the prior art made of record and considered pertinent to the applications' disclosure do not teach or suggest the claimed

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limitations. Barth, Heremans and Ramdani, taken alone or in combination, fail to teach the claimed limitation an apparatus comprises a composite dielectric material wherein a first dielectric material comprising cubic boron nitride surrounds a different second dielectric material as recited in independent claim 8.

Conclusion

A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to become abandoned (see M.P.E.P 710.02(b)).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andy Huynh, (571) 272-1781. The examiner can normally be reached on Monday-Friday from 8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The Fax number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the -status of this application or proceeding should be directed to the receptionist whose phone number is (703) 308-0956.

ah

08/04/04



Andy Huynh

Patent Examiner